

# Status of the 1990 Physical Fitness and Exercise Objectives —Evidence from NHIS 1985

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## Synopsis.....

*The 1985 National Health Interview Survey (NHIS) Health Promotion and Disease Prevention Questionnaire provides information regarding the status of 4 of the 11 physical fitness and exercise objectives for 1990.*

*A specially developed scoring algorithm was used to determine the percentage of persons participating in appropriate physical activity (that is, "exercise, which involves large muscle groups in dynamic movement for periods of 20 minutes or longer, 3 or more days per week, and which is performed at an intensity of 60 percent or greater of an individual's cardiorespiratory capacity" and three other categories: regular activity, but not appropriate physical activity; irregular activity; and those who were sedentary.*

*Results revealed that the young and persons of relatively high socioeconomic status are more likely to perform appropriate physical activity in their leisure time. When rigid criteria were used, only 5.1 percent of those surveyed knew the appropriate duration, frequency, and intensity of physical activity needed to strengthen the heart and lungs.*

*It was not possible to determine if exercise prevalence has increased in recent years; however, it will be possible to detect trends in the future when this survey is repeated in 1990.*

**P**HYSICAL ACTIVITY HAS BECOME increasingly recognized as an important health-related behavior with considerable potential for promoting public health. Increased levels of physical activity have been associated with reduced risk of coronary heart disease (1), enhanced weight control (2), and reduced symptoms of anxiety and mild to moderate depression (3). Further, there is emerging evidence that physical activity may have important beneficial effects on certain other psychological conditions (3), hypertension (4), and osteoporosis (4). Enhanced levels of physical activity can also improve the capacity of the individual to perform a given physical task, usually with a corresponding decrease in perceived effort. This increased capacity to perform physical activity may in turn improve the likelihood that physical activities will be performed and, perhaps most important, will produce an enhanced sense of well-being derived from feeling and looking better (3).

For these reasons, the Public Health Service has proposed 11 physical fitness and exercise objectives to help Americans achieve such benefits (5). Of the 11 objectives, the following 4 can be addressed in

some manner by the data collected in the Health Promotion Disease Prevention Study, part of the 1985 National Health Interview Survey (NHIS-HPDP). The objectives follow:

1. By 1990, the proportion of adults 18–65 years old participating regularly in vigorous physical exercise should be greater than 60 percent.
2. By 1990, 50 percent of adults 65 years and older should be engaged in appropriate physical activity, for example, walking, swimming, or other aerobic activity.
3. By 1990, the proportion of adults who can accurately identify the variety and duration of exercise thought to promote most effectively cardiovascular fitness should be greater than 70 percent.
4. By 1990, data should be available for regular monitoring of national trends and patterns of participation in physical activity, including participation in public recreation programs in community facilities.

Powell and coworkers have recently reviewed available data to determine our status in meeting these four objectives (6). They reported that, using recent unpublished estimates from the State-based Behavioral Risk Factor Surveillance System,

*'When asked about the number of days per week one should exercise, 39.3 percent of the respondents gave the correct response: 3-4 days per week. About 5.5 percent reported 0-2 days per week, while 37.8 percent reported 5-7 days per week. The remainder, 17.4 percent, either did not know or would not provide an answer.'*

roughly 10-20 percent of the 18-65-year-olds and the same percentages of persons 65 and older met objectives 1 and 2. For objective 3, it was found that roughly 70 percent of persons surveyed in a Los Angeles and a Dallas community could identify accurately the duration and frequency of vigorous exercise required to promote cardiovascular fitness effectively, and 50-90 percent of respondents in these two surveys and a national survey could accurately identify the intensity required for such benefit.

An analysis of the NHIS-HPDP data is extremely useful to evaluate the status of the four physical fitness and exercise objectives mentioned previously because little survey data are available to provide national estimates.

## Methods

The first two of the 1990 objectives for physical fitness and exercise concern our ability to estimate "appropriate physical activity," defined as "exercise which involves large muscle groups in dynamic movement for periods of 20 minutes or longer, 3 or more days per week, and which is performed at an intensity of 60 percent or greater of an individual's cardiorespiratory capacity" (5). The need to use this definition of appropriate physical activity is important because research indicates that such exercise can lead to improvements in cardiorespiratory fitness (7) that may in fact be cardioprotective. At present, however, this definition of physical activity has been used only in the National Child and Youth Fitness Survey of youth aged 10-18 years (8). It has not been applied to the general population of adults, who differ in their cardiorespiratory capacity to perform activities owing to the influences of age and sex. Few

surveys have obtained the information required to estimate all of the components of the definition.

Because the definition of participation in physical activity for the 1990 objectives is so rigorous and specific, it was necessary to develop a special scoring procedure to estimate the prevalence of persons performing appropriate physical activity. However, due to the exclusionary nature of this definition, we also felt that it would be important to distinguish other persons who did not meet the criteria for appropriate physical activity participation, based on other characteristics of their physical activity behavior. As such, the scoring procedure was developed to assign persons to one of four categories:

1. Sedentary—no reported activity.
2. Irregularly active—one or more activities are reported but the duration and frequency of the combined activities are less than 20 minutes per session, less than three times per week, or both.
3. Regularly active, not meeting the 1990 objectives—one or more activities are reported. Alone or in combination they are performed 20 minutes or more per session, three times or more per week. However, either the requirement of 60 percent of cardiorespiratory capacity or the requirement of dynamic activity with large muscle groups has not been met, or neither has been met.
4. Regularly active, meeting the 1990 objectives—one or more activities are reported. Alone or in combination they are performed 20 minutes or more per session, three times or more per week. In addition, the requirement of 60 percent of cardiorespiratory capacity and the requirement of dynamic activity with large muscle groups are both met.

The elements required by the scoring procedure were derived either from the actual data or by using published regression equations. The frequency and duration were derived directly from the NHIS-HPDP Survey data. The respondent's maximum cardiorespiratory capacity was derived from one of two sex-specific regression equations, proposed by Jones and Campbell (9), that use age as a predictor variable. Intensity was based on values reported by Stephens and Craig as proposed for the Canada Fitness Survey (10). The intensity code was expressed in Mets; 1 Met is the value of resting oxygen uptake relative to total body mass and is generally ascribed the value of 3.5 milliliters of oxygen per kilogram of body mass per minute.

Ten Mets would equal 10 times the resting level (10,11).

The final activity intensity code for a specific activity was found by selecting one of three conditions corresponding to the perceived level of effort associated with usual participation. The perceived effort was associated with none or small, moderate, or large perceived increases in heart rate or breathing. For example, the activity intensity code for three levels of volleyball participation would be 5, 6, and 8 Mets as the perceived effort increased from none or small to large increases in heart rate or breathing. In some cases a single intensity code was averaged for several types of activity participation that were not distinguished in the NHIS-HPDP. This averaging was done for such activities as golf, calisthenics or general exercise, swimming or water exercises, skating, and skiing. To determine if an activity would qualify a person to meet the intensity criterion of appropriate physical activity, each intensity code had to meet or exceed 60 percent of the maximal cardiorespiratory capacity.

We categorized each of the activities reported as to whether it was likely to be dynamic and involve large muscle groups when performed by most people. The following activities were deemed unlikely to involve rhythmically contracting large muscle groups: boating for pleasure, bowling, carpentry, fishing from a bank or boat, gardening, golf, horseback riding, judo and karate, painting and papering the house, softball, stream fishing, surfing, water skiing, and weightlifting.

If a physical activity could not be assigned a published value, it was arbitrarily assigned an intensity code of 1.8 so that someone reporting such activity could at least be classified as irregularly or possibly regularly active. If two or more activities had to be combined to achieve the requirements of three or more sessions per week, then each activity had to be done for 20 or more minutes per session to qualify as "regularly active," whether or not it met the criteria for appropriate physical activity.

## Findings

The scoring procedure was used to create table 1, which shows the percentage distribution of persons meeting the four categories of physical activity participation by demographic characteristics and occupational physical activity. In the sedentary category, the rates for men (24.8 per-

Table 1. Percentage distribution of 4 levels of leisure-time physical activity by gender, age, education, race, occupational activity, and income level

| Category                         | Number<br>in<br>thousands | Sedentary | Irregularly<br>active | Regularly<br>active,<br>but not<br>appropriate<br>physical<br>activity | Regularly<br>active and<br>appropriate<br>physical<br>activity |
|----------------------------------|---------------------------|-----------|-----------------------|--|--|
| <i>Gender</i>                    |                           |           |                       |  |  |
| Male .....                       | 80,779                    | 24.8      | 30.9                  | 36.2   | 8.1  |
| Female .....                     | 90,192                    | 30.2      | 31.3                  | 31.5   | 7.0  |
| <i>Age</i>                       |                           |           |                       |  |  |
| 18-29 years ....                 | 48,325                    | 18.3      | 30.1                  | 41.5   | 10.1   |
| 30-44 years ....                 | 51,092                    | 24.2      | 34.5                  | 33.7   | 7.7  |
| 45-64 years ....                 | 44,512                    | 32.7      | 31.9                  | 30.8   | 4.7  |
| 65 years and<br>older .....      | 27,034                    | 42.6      | 25.0                  | 24.9   | 7.5  |
| <i>Education</i>                 |                           |           |                       |  |  |
| Less than 9 years                | 18,112                    | 49.2      | 25.9                  | 20.2   | 4.7  |
| 9-11 years .....                 | 22,625                    | 35.5      | 31.4                  | 28.3   | 4.9  |
| 12 years .....                   | 66,536                    | 26.9      | 32.7                  | 34.4   | 6.0  |
| 13 years or more                 | 62,536                    | 18.5      | 31.1                  | 39.3   | 11.1   |
| <i>Race</i>                      |                           |           |                       |  |  |
| White .....                      | 148,239                   | 27.1      | 31.1                  | 34.1   | 7.7  |
| Black .....                      | 18,580                    | 31.9      | 31.2                  | 30.0   | 6.9  |
| Other .....                      | 4,153                     | 30.4      | 28.8                  | 33.8   | 7.1  |
| <i>Occupational<br/>activity</i> |                           |           |                       |  |  |
| Light .....                      | 125,008                   | 28.2      | 30.1                  | 33.5   | 8.2  |
| Moderate .....                   | 28,110                    | 25.1      | 33.9                  | 34.9   | 6.1  |
| Heavy .....                      | 17,854                    | 27.8      | 33.3                  | 33.4   | 5.5  |
| <i>Income</i>                    |                           |           |                       |  |  |
| Less than<br>\$7,000 .....       | 16,609                    | 35.1      | 26.0                  | 30.5   | 8.5  |
| \$7,000-\$14,999                 | 26,435                    | 32.1      | 30.0                  | 31.6   | 6.3  |
| \$15,000-\$24,999                | 34,853                    | 28.1      | 32.0                  | 33.4   | 6.5  |
| \$25,000-\$39,999                | 40,716                    | 22.9      | 33.3                  | 36.4   | 7.5  |
| \$40,000 or more                 | 31,907                    | 19.0      | 32.6                  | 37.9   | 10.5   |

SOURCE: 1985 National Health Interview Survey, Health Promotion and Disease Prevention Questionnaire.

cent) were somewhat lower than those for women (30.2 percent). The rates for irregularly active were similar for men and women (30.9 versus 31.3 percent). Rates for men were somewhat higher than for women for two categories of regular physical activity participation. There were 31.5 to 36.2 percent of men and women who were regularly active but did not meet the criteria for appropriate physical activity, with only 7.0 to 8.1 percent having met the criteria for appropriate physical activity.

With increases in age from 18 to 65 years and older, there was an increase among persons considered to be sedentary (from 18.3 to 42.6 percent); a slight increase followed by a small decline in those qualifying as irregularly active (from 30.1 to 34.5 and then 31.9 to 25.0 percent); a decrease in those meeting the criteria for regular participation in

*'Combining the responses . . . made it possible to determine how many persons understood fully the amount of exercise necessary to benefit the heart and lungs. . . . only 5.1 percent had correct responses to all three questions; 23.5 percent had two correct answers; 33.6 percent had only one correct answer; and 37.9 percent had incorrect responses (or did not respond) to all three questions.'*

physical activity but not the criteria for appropriate physical activity (from 41.5 to 24.9 percent); a slight decrease among persons meeting the criteria for regular participation in physical activity and appropriate physical activity (from 10.1 to 7.5 percent).

As the educational levels among persons surveyed increased from less than 9 years to 13 years or more, the percentage of persons classified as being sedentary declined by more than one-half, from 49.2 to 18.5 percent. There was a modest increase in those classified as being irregularly active (from 25.9 to 31.1 percent) as educational level increased. There was an almost twofold increase in those meeting the criteria for regular participation in physical activity but not the criteria for appropriate physical activity (from 20.2 to 39.3 percent), and increase among persons meeting the criteria for regular participation in physical activity and appropriate physical activity (from 4.7 to 11.1 percent) as educational level increased.

For race categories there was essentially a similar percentage of persons qualifying as irregularly active (from 28.8 to 31.1 percent) and meeting the criteria for regular activity and appropriate physical activity (from 6.9 to 7.7 percent). Somewhat fewer persons classified as "white" were sedentary (27.1 percent); however, the rates for "black" (31.9 percent) and "other" (30.4 percent) were virtually the same. A similar percentage of those classified as "white" and "other" reported regular but not appropriate physical activity (34.1 and 33.8 percent), while each did slightly more than those classified as "black" (30.0 percent).

As occupational physical activity levels increased, there was a decrease for those meeting

criteria for regular and appropriate physical activity (from 8.2 to 5.5 percent). For all other classifications, the rates were virtually identical. However, it is important to note that there was no age adjustment for these rates.

For reported income there was a general decrease in the percentage of persons classified as sedentary (from 35.1 to 19.0 percent) as income level increased. A corresponding increase occurred among those who were regularly active, but did not meet the criteria for appropriate physical activity (from 30.5 to 37.9 percent). The percentages of those classified as irregularly active increased (from 26.0 to 33.3 percent) as income level increased, except for the highest income level where percentages were very similar (33.3 versus 32.6 percent). For persons meeting the criteria for regular and appropriate physical activity, those in the lowest income group reported a higher participation rate (8.5 percent) than those in the three middle-income groups (6.3, 6.5, and 7.5 percent). Those in the high-income group reported the highest participation rate (10.5 percent). Again, age adjustments were not performed for these rates.

Three separate questions were asked to examine the respondent's knowledge of the amount of exercise necessary to strengthen the heart and lungs. Table 2 presents the responses to those questions. When asked about the number of days per week one should exercise, 39.3 percent of the respondents gave the correct response: 3-4 days per week. About 5.5 percent reported 0-2 days per week, while 37.8 percent reported 5-7 days per week. The remainder, 17.4 percent, either did not know or would not provide an answer.

When asked how many minutes one should exercise on each occasion, 22.7 percent gave the correct response: 15-25 minutes, 5.8 percent said less than 15 minutes per occasion, and 51.7 percent replied more than 25 minutes per occasion. About 20 percent did not know or would not answer.

To the question how hard one should exercise, 33.8 percent gave the correct answer: "a lot faster but talking is possible". About 3.5 percent said "no faster than usual," while 44.8 percent said "a little faster than usual." Less than 1 percent reported "so fast that talking is not possible," and 17.2 percent either did not know or would not answer.

Combining the responses to each of the three questions made it possible to determine how many persons understood fully the amount of exercise

necessary to benefit the heart and lungs. Only 5.1 percent had correct responses to all three questions; 23.5 percent had two correct answers; 33.6 percent had only one correct answer; and 37.9 percent had incorrect responses (or did not respond) to all three questions.

## Discussion

The 11 physical fitness and exercise objectives for 1990 serve as guidelines for promoting physical activity in the United States (Caspersen and Heath, unpublished report to the Henry J. Kaiser Family Foundation on priority strategies in the promotion of physical activity). For four of these objectives the NHIS-HPDP Survey provides useful data in evaluating progress toward attaining them.

Stephens and coworkers recently reviewed the literature on population-based estimates of physical activity of Americans and Canadians and concluded there is little consistency among surveys and polls regarding activity status (12). They estimated that the prevalence of active Americans ranged from 15 to 78 percent; the smallest estimates generally represented the more rigorous definitions of activity. The definition of appropriate physical activity used in the 1990 objectives is extremely rigorous as well. For example, Powell and coworkers have previously estimated that only about 10-20 percent of Americans meet the definition of appropriate physical activity used in the 1990 objectives (6). In the NHIS-HPDP Survey we found that only 7.6 percent of Americans aged 18-65 years and 7.5 percent of those 65 years or older reached this level of activity. These proportions are considerably short of meeting the ambitious goals of having 60 percent participation in appropriate physical activity for 18-65-year-olds and the goal of 50 percent participation for persons 65 years and older.

There have been few estimates of the level of knowledge among Americans about the variety and duration of exercise required to promote cardiorespiratory fitness effectively (6). Powell and coworkers reported recently that roughly 70 percent of persons surveyed in Dallas and Los Angeles could identify accurately the duration and frequency of exercise required to effectively promote cardiorespiratory fitness (6). In addition, between 50 and 90 percent of persons surveyed in Dallas and Los Angeles and in the Perrier Fitness Study could identify accurately specific activities normally required for such benefit.

Table 2. Percentage of respondents correctly answering exercise knowledge questions, 1985 Health Promotion and Disease Prevention Survey

| Question and possible responses  | Percent |
|--|---------|
| How many days a week do you think a person should exercise to strengthen the heart and lungs?                                |         |
| 0-2 days .....   | 5.5     |
| 3-4 days .....   | 39.3    |
| 5-7 days .....   | 37.8    |
| Don't know .....   | 17.4    |
| For how many minutes do you think a person should exercise on each occasion so that the heart and lungs are strengthened?    |         |
| Less than 15 minutes .....   | 5.8     |
| 15-25 minutes .....  | 22.7    |
| More than 25 minutes .....   | 51.7    |
| Don't know .....   | 19.8    |
| During those minutes, how fast do you think a person's heart rate and breathing should be to strengthen the heart and lungs? |         |
| No faster than usual .....   | 3.5     |
| A little faster than usual .....   | 44.8    |
| A lot faster but talking is possible .....   | 33.8    |
| So fast that talking is not possible .....   | 0.8     |
| Don't know .....   | 17.2    |
| Number of correct responses to 3 exercise questions:   |         |
| None correct .....   | 37.9    |
| 1 correct .....  | 33.6    |
| 2 correct .....  | 23.5    |
| All 3 correct .....  | 5.1     |

SOURCE: 1985 National Health Interview Survey, Health Promotion and Disease Prevention Questionnaire.

The NHIS-HPDP Survey does not provide information on respondents' knowledge about the best types of activities that must be performed to achieve cardiorespiratory benefit; however, results were available for the duration, frequency, and intensity needed to accrue such benefits. Only 39.3 percent knew the appropriate number of days per week, 22.7 percent knew the number of minutes per occasion, and 33.8 percent knew the level of intensity required to strengthen the heart and lungs. Only 5.1 percent correctly answered all three questions. This proportion is certainly far less than the more optimistic estimates provided by Powell and coworkers and points to the continuing need to educate the American population regarding exercise. Nonetheless, our findings warrant a cautionary note. The cutoff for correct answers was 3-4 days per week and 15-25 minutes per occasion. It is obvious that reported values greater than these limits will also strengthen the heart and lungs, as evidenced by standards set forth by the

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American College of Sports Medicine (7). However, there is also an increase in injuries associated with such high levels of participation (7). Reported values greater than the recognized minimum may not necessarily be incorrect, but they may not be prudent, either.

Since the ranges we selected for correct answers to the knowledge questions may be too stringent, we also looked at broader response groupings. A total of 77.1 percent reported between 3 and 7 days per week as the correct frequency, 74.4 percent reported greater than 15 minutes per occasion as the correct duration, and 78.6 percent said the correct intensity was either "a little faster than usual" or "a lot faster but talking is possible." When this broader definition is used, it is apparent that correct answers range between 74.4 and 78.6 percent. Further, there were 63.7 percent who answered all three questions correctly when liberal response groupings were used.

The lack of precision in the general population's perceptions of the appropriate amount of physical activity stems in part from the controversy in the scientific community about the importance of cardiorespiratory fitness (13-15). Until the scientific leaders can achieve consensus on this issue, it is unlikely that lay persons will become knowledgeable. Finally, it is important to recognize that it is difficult to develop short, simple, valid knowledge questions to assess such a complex behavior as physical activity without giving the correct answers to the questions at the same time. Better questions, with established reliability and validity, must be developed.

The NHIS-HPDP Survey serves as a system to monitor national trends and patterns of participation in physical activity. Because the questions are

unique to this survey, we must await the readministration of this survey in 1990 to assess trends.

NOTE: The design of the survey is described in detail in "The 1985 Health Promotion and Disease Prevention Survey" by Owen T. Thornberry, Ronald W. Wilson, and Patricia M. Golden, *Public Health Reports* 101: 566-570, November-December 1986.

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